# Status of the Nanoscale Ordered Material Diffractometer (NOMAD)


**INSTRUMENT TEAM**

**Jörg Neuefeind**
(neuefeindjc@ornl.gov)

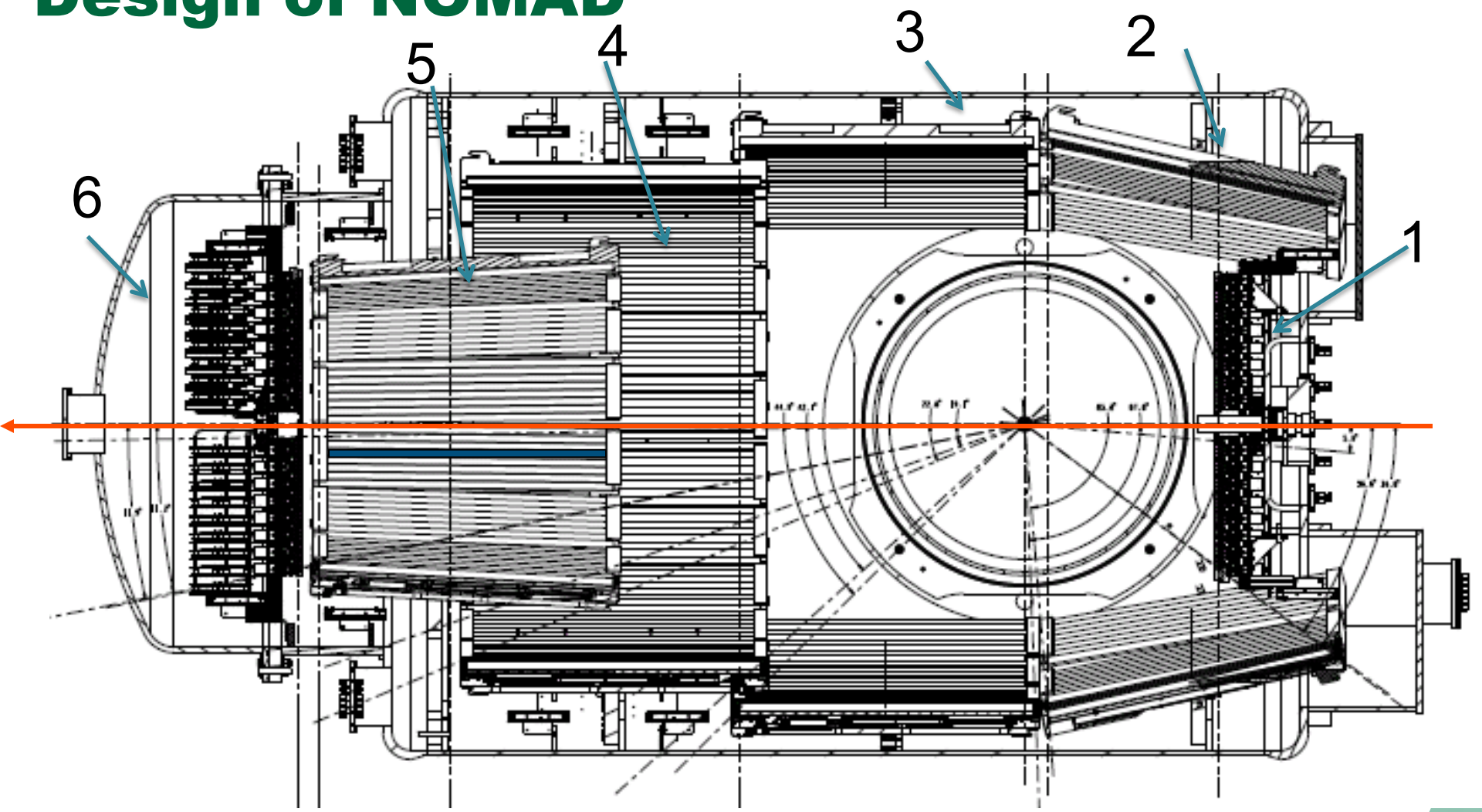
**Mikhail Feygenson**
(feygensonm@ornl.gov)

**John Carruth**
(carruthjw@ornl.gov)

# What is NOMAD?

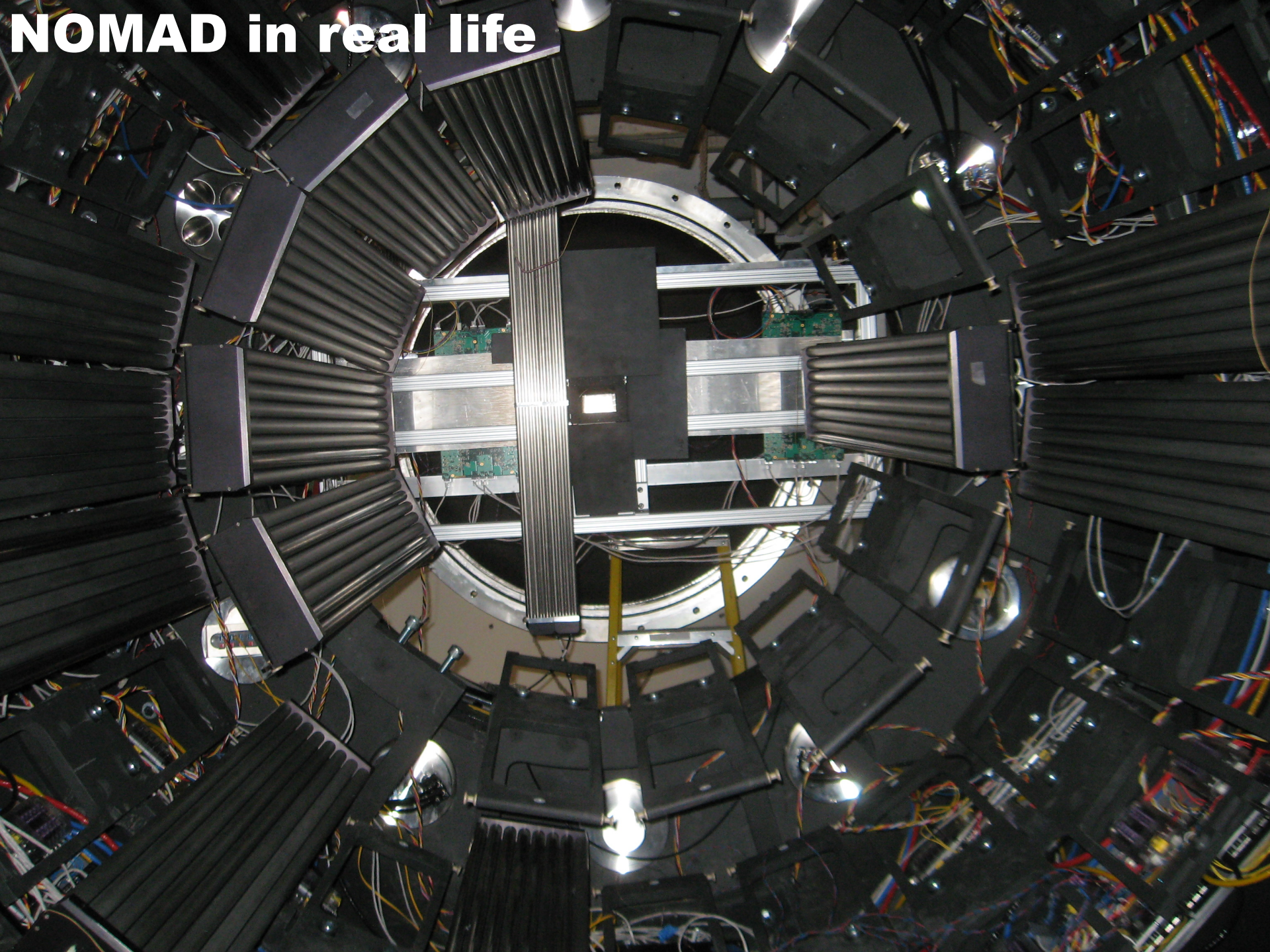
- NOMAD is a diffractometer using a large bandwidth of neutron energies and extensive detector coverage to do structural determinations of local order in crystalline and amorphous materials.
- NOMAD was designed for studies of a large variety of samples ranging from liquids, solutions, glasses, polymers and nanostructured materials to long-range ordered crystals.
- NOMAD gives an access to high-resolution pair distribution functions (PDF), small-contrast isotope substitution experiments, small sample sizes, parametric studies and in-situ diffraction.

# Design of NOMAD

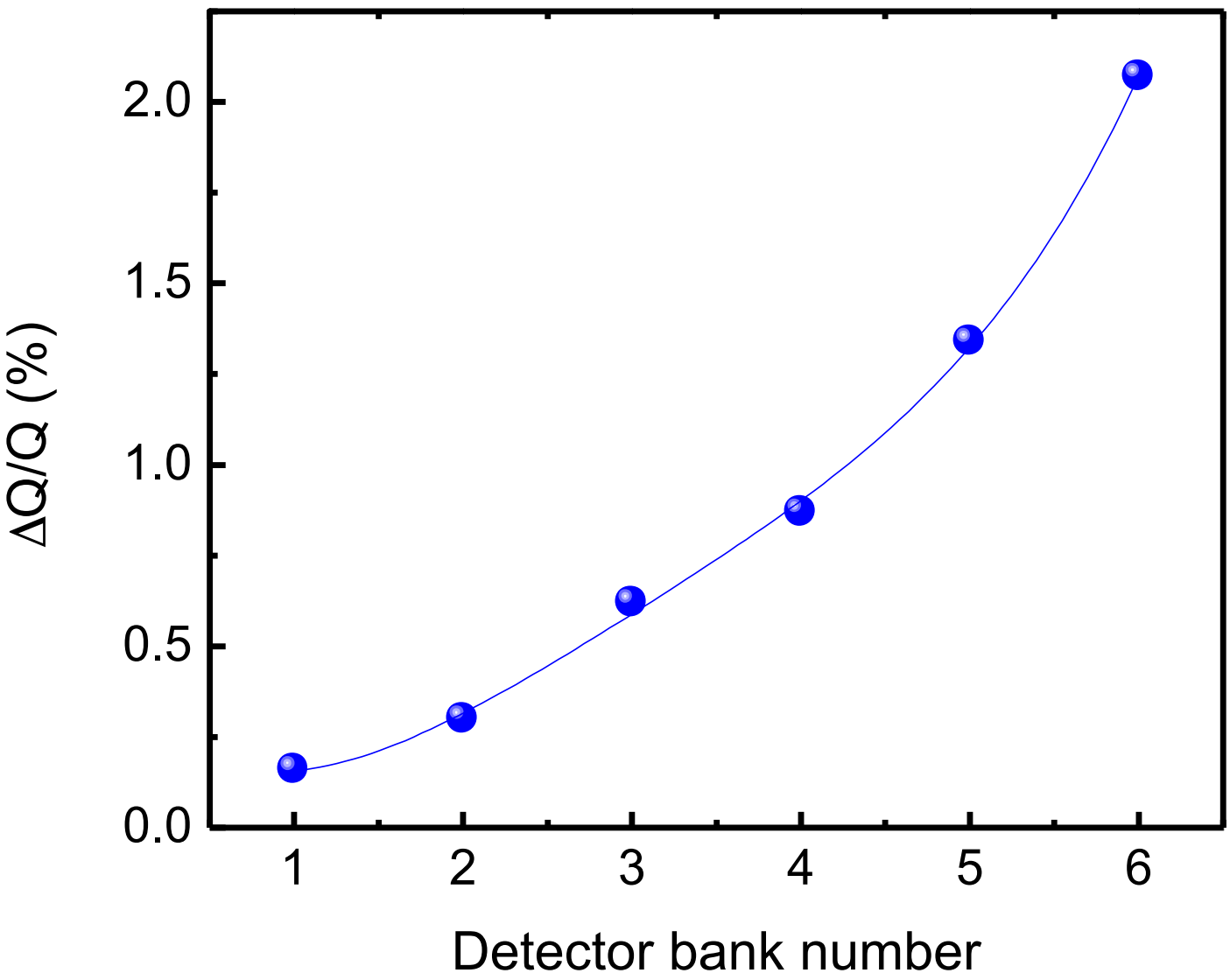



Currently, 38 out of 99 packs with eight $^{3}$He linear position sensitive detectors are installed. 38900 pixels are grouped into six “banks”.

# NOMAD in real life

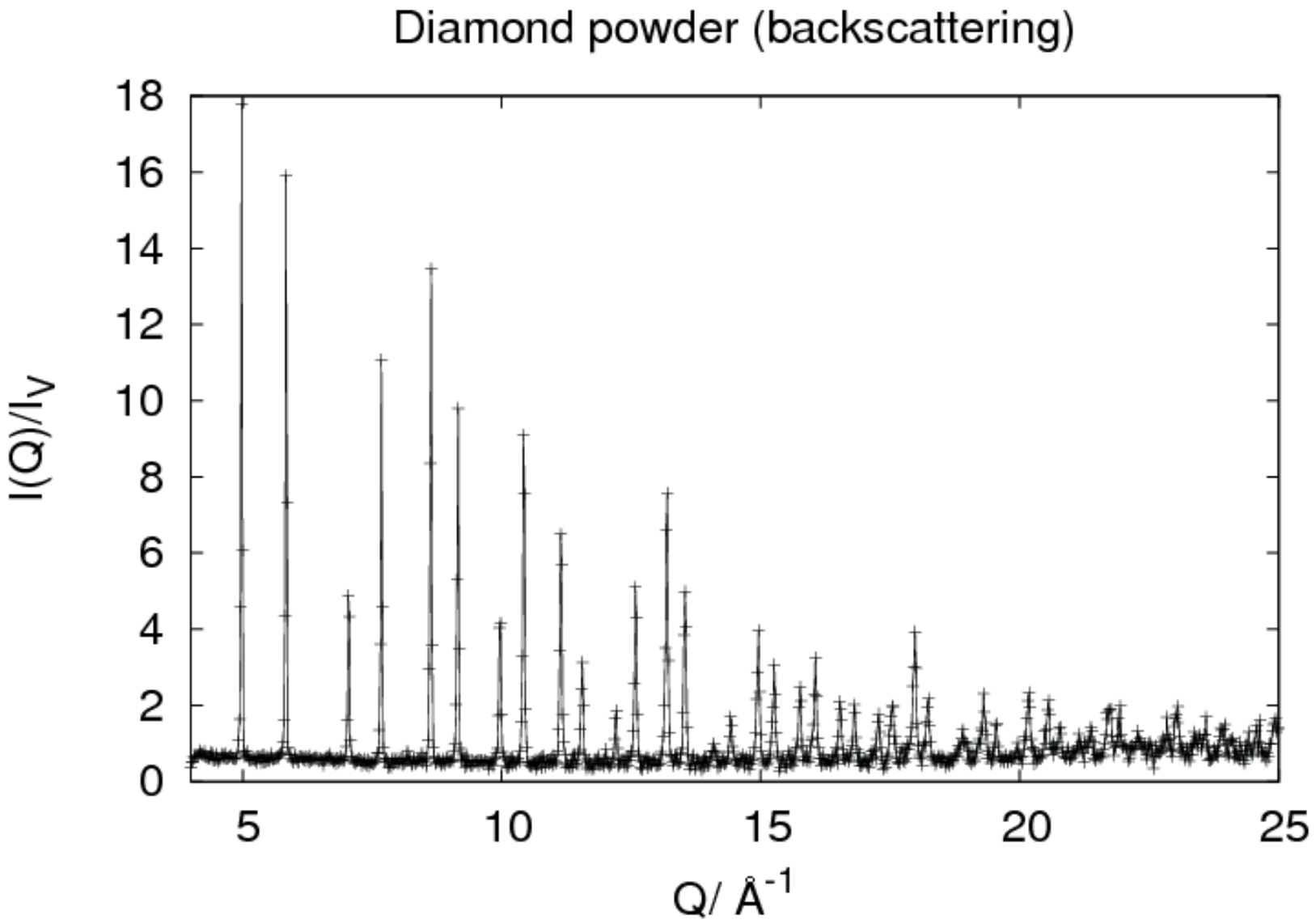


# Resolution ΔQ/Q

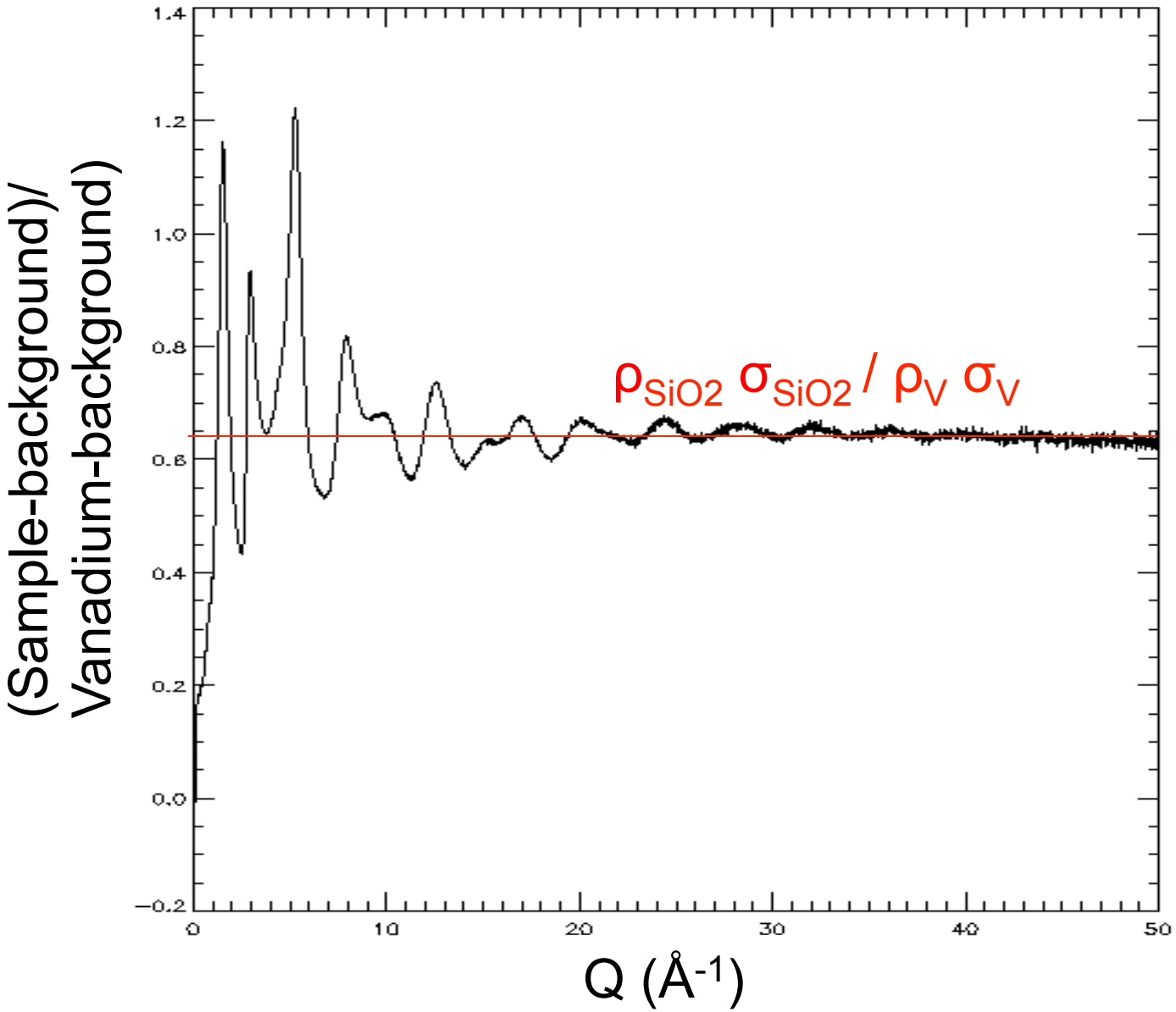



All values Gaussian σ measured for diamond (311) at q=5

# The data obtained in 1 second on 0.6 g sample

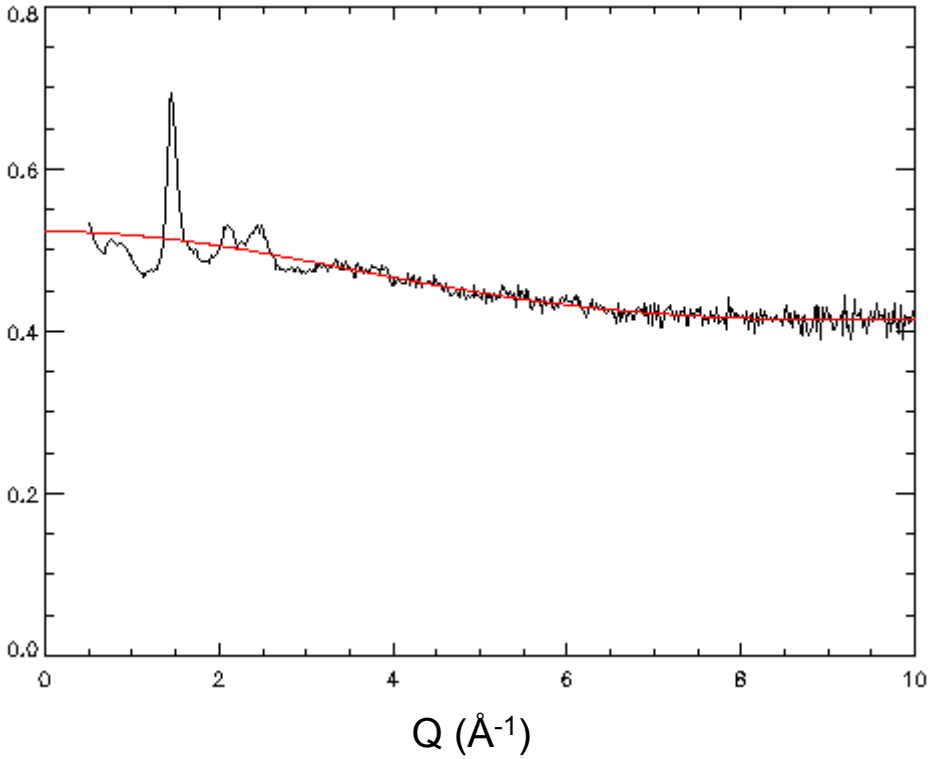


# 20 min data on $SiO_2$

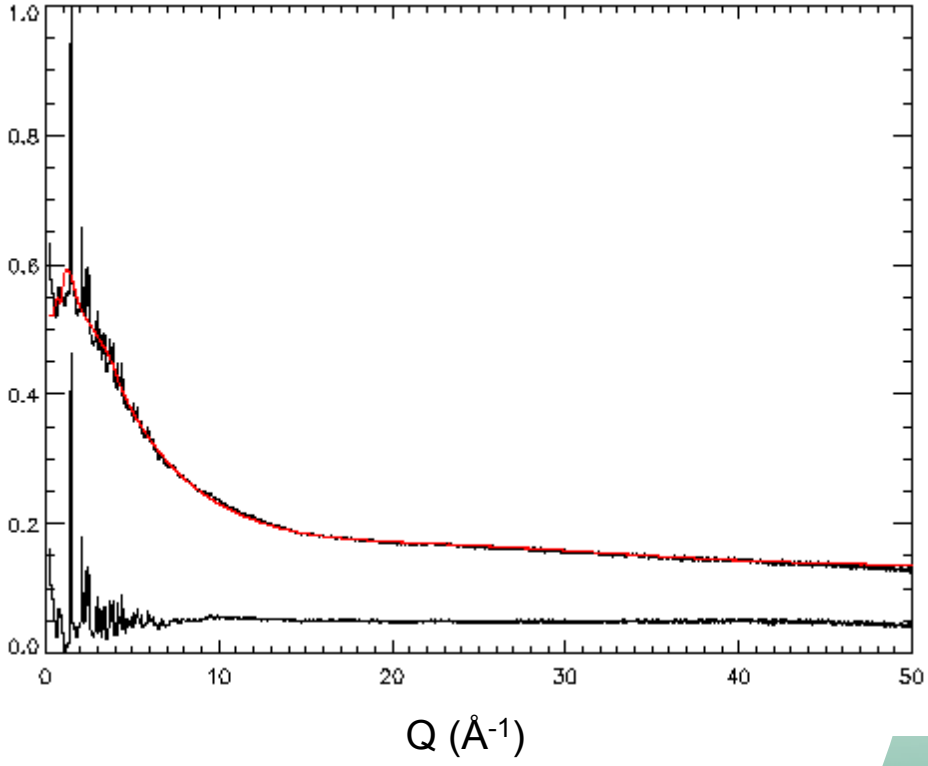


# Samples with hydrogen

Forward detector bank




All detectors




**⇒There needs to be a good reason not to replace H with D.**

# Sample size considerations

- **Neutron sized samples = synchrotron sized data acquisition times**
- **Synchrotron sized samples = neutron sized data acquisition times**

# Sample environment

- Room temperature sample changer for 24 samples
- Bottom loading CCR (10- 350K)
- Stick furnace (300-700K)
- High voltage set-up (20kV)
- Aerodynamic levitator (300 -1700K) (tests)
- TiZr pressure cell 1000bar (tests)
- Low temperature sample changer (tests)
- Orange cryostat (4-300K) (tests)